12.1.2 Kaiser Permanente (USA)

Kaiser Permanente HealthConnect®, is a comprehensive electronic health record and one of the largest private electronic health systems in the world. KP HealthConnect with its integrated model securely connects more than 611 medical offices and 37 hospitals, linking patients to their health care teams, their personal health information and the latest medical knowledge.[1]

For more information please visit http://share.kaiserpermanente.org/.

Kaiser Permanente (KP) has been involved in the development of SNOMED CT since its inception. Preceding this, KP collaborated with the College of American Pathologists in the 1990's on the immediate predecessor of SNOMED CT (SNOMED-RT). Some of the very earliest deployments of SNOMED CT have been within KP electronic patient record systems.

The terminology services deployed within the KP HealthConnect electronic health record illustrate the practical use of SNOMED CT as a key reference terminology within a multi-coding system environment. KP is also at the forefront of realizing new possibilities offered by SNOMED CT using its description logic capabilities.

Convergent Medical Terminology

Convergent Medical Terminology (CMT) is KP's Enterprise Terminology System. While the KP HealthConnect EHR system is built by Epic (see case study 12.2.10 Epic), the CMT is proprietary to Kaiser Permanente. CMT hosts several components:

- Standard reference terminologies
- End user terminology (e.g. the terms presented to clinicians or patients)
- Administrative codes and classifications (e.g. ICD-9-CM, ICD-10-CM, CPT4, HCPCS)
- Analytics services (querying and decision support)
- Request submission for new terms

CMT uses SNOMED CT as a reference terminology, taking advantage of its poly-hierarchy and definitional attributes to support advanced analytics – for example:

- Identifying patient cohorts with certain conditions for Population Care.
- Identifying subsets for use as "input criteria" for KPHC decision support modules, such as Best Practice Alerts, Reminders, etc.
- Performing queries such as "find all conditions where |causative agent| is |Aspergillus (organism)|"
- Performing large aggregate queries, such as "find all patients coded with concepts in the cardiovascular disorders subset"

In September 2010 Kaiser Permanente, IHTSDO and the US Department of Health and Human Services jointly announced KPs donation of their CMT content and related tooling to SNOMED International. The donation consists of terminology content (including several CMT subsets), tools to help create, manage and quality control terminology.

Collaboration with Oxford University

KP in collaboration with the Information Systems Group at Oxford University are investigating how to perform complex queries efficiently across extremely large numbers of patient records. The team at Oxford University has developed an open source triple store (i.e. 'subject-predicate-object') database called RDFox. RDFox is highly scalable and performant 'Not Only SQL' database readily distributed across parallel processing units. RDFox is an implementation of the W3C Resource Description Framework (RDF) standard, which supports OWL-RL description logic.

In this collaborative project, clinical data is being represented in OWL-RL as 'entity-role-act' triples. This uses a logical model (with Entities in Roles participating in Acts) that is similar to HL7 V3's Reference Information Model. OWL-RL and Datalog rule language is being used to reason over hundreds of millions of patient data triples. While SNOMED CT expressions cannot be fully represented in OWL-RL, RDFox performs the preliminary large-scale clinical data retrieval to return a far smaller record set. This smaller set is then processed using a richer featured but less performant description logic reasoner supporting SNOMED CT.

Prototype work has been completed using real patient data, including observations for diabetes (coded using SNOMED CT) and observations of Hemoglobin A1C levels. Datalog instructions and SPARQL queries were used to calculate Healthcare Effectiveness Data and Information Set quality measures for diabetes management – for example, both numerators and denominators for the Diabetes HgB A1C report.

Footnotes

RefNotes

1 http://share.kaiserpermanente.org/total-health/connectivity/